Cool Creek Watershed Management Plan Report

City of Carmel

Town of Westfield

Hamilton County

Presentation to:
Hamilton County Drainage Board
August 25, 2003

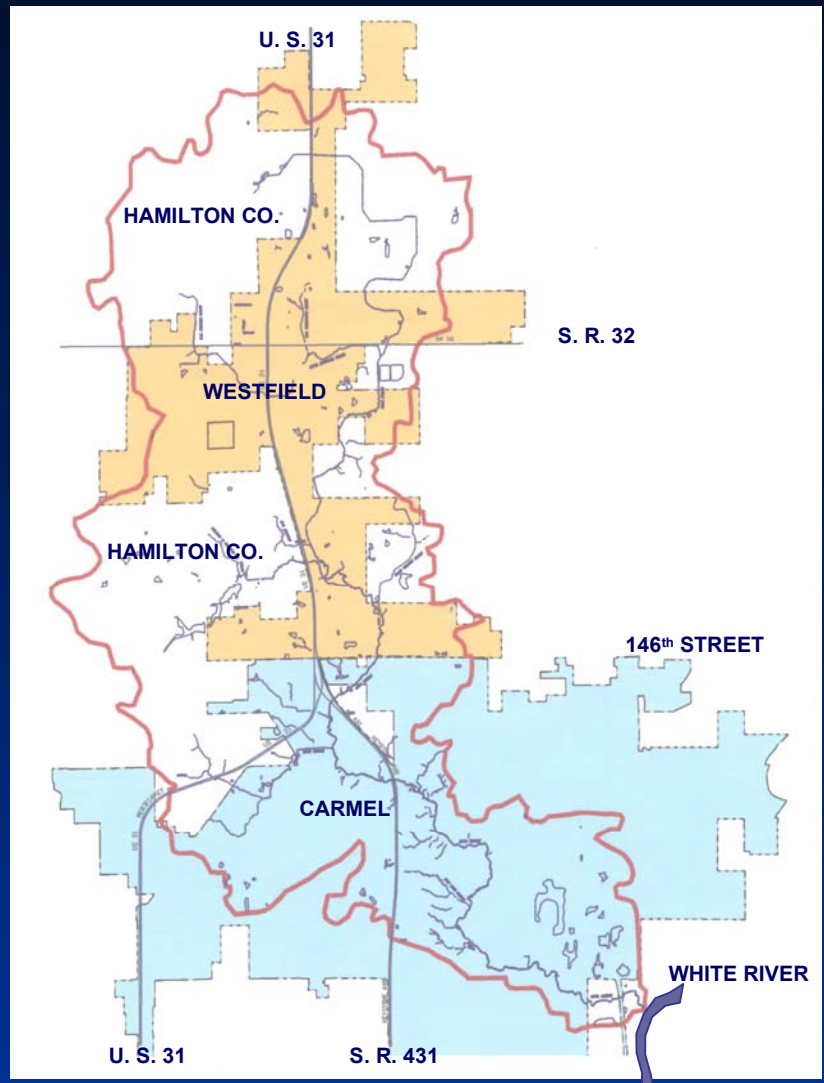
Clark Dietz

Agenda

- Description of the Watershed
- Purpose
- Scope
- Key Findings
- Recommendations

Cool Creek Watershed

- Approximately 23.7 mi.^{2}
- From 199th Street to White River, near 116th Street
- Large Portions of Westfield and Carmel and parts of unincorporated Hamilton County
- Lower watershed mostly developed, upper watershed experiencing rapid growth



Purpose of the Study

- Address Existing Stormwater Flooding Problems
- Prevent Future Problems as the Watershed Continues to Develop
- Compliance with New Federal Regulations Governing Stormwater Quality.

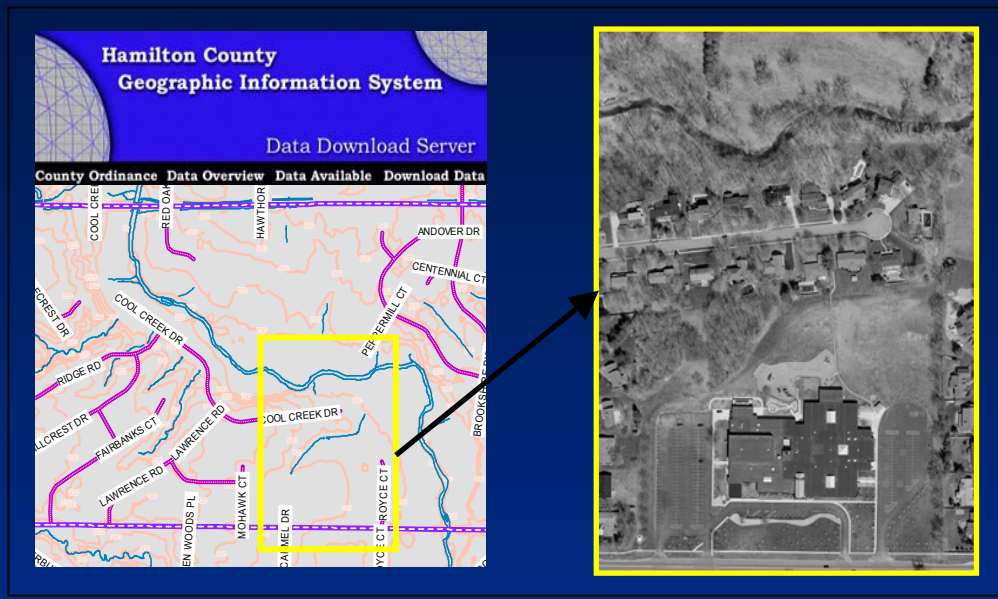
Scope of the Study

- Inventory and Problem Identification
- Problem Analysis
- Solution Development
- Recommendations

Inventory & Problem Identification

Map & Plans

- GIS
- USGS
- National Wetland Inventory
- Flood Insurance Rate
- Zoning Maps
- Aerial Photographs



Inventory & Problem Identification

Previous Reports & Studies

- IDNR Memorandum – Grassy Branch (2001)
- Hydraulic Report for Village Farms Wilfong (1996)
- Countryside Overall System Drainage Report (2001)
- Soil Survey of Hamilton County, Indiana (1978)
- Flood Insurance Studies (study incorporates recent FEMA updates)
- US 31 Improvement Project documents

Inventory & Problem Identification

Ordinances & Standards

- Consistent Stormwater Management Controls.
- Detention Facility Requirements.
- Downstream Channel Protection.
- Water Quality Enhancement.
- Prohibition on Development in Floodplains.

Inventory & Problem Identification

Public Input

- Public Meetings
- Developer Input
- Interviews with:
  - Local Staff
  - Citizens

Inventory & Problem Identification

Problem Area Map

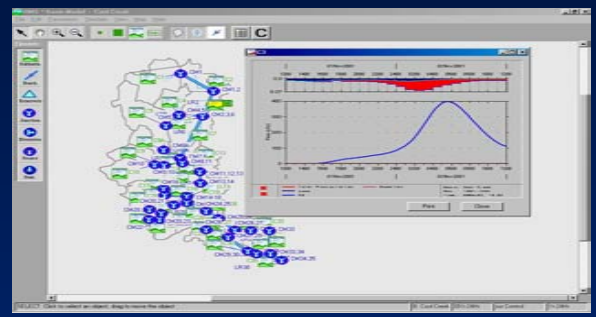
Problem Analysis

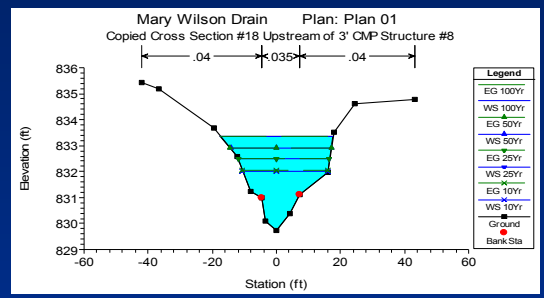
- Hydrologic/Hydraulic Analysis
- Water Quality Evaluation

Problem Analysis

Hydrologic/Hydraulic Analysis

- Assess the Volume and Flow Rate of Rainfall Runoff for Various Storm Events.
- Evaluate the Existing Facilities Designed to Convey and/or Detain Runoff Flows.
- Ascertain the Impact on Runoff with Future Developments and Determine Stormwater Management Needs.

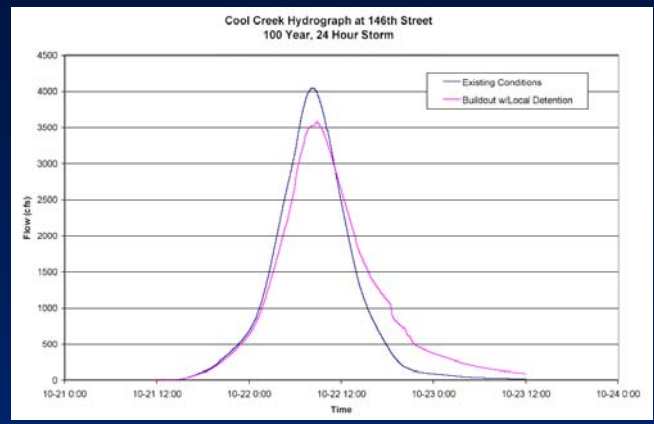




Problem Analysis

Effects of Urbanization

- Higher peak flows as a result of urbanization
- County detention policy is effective in controlling peak flows
- Longer flow durations and more frequent “bank-full” conditions tend to exacerbate erosion, especially along the downstream channels.

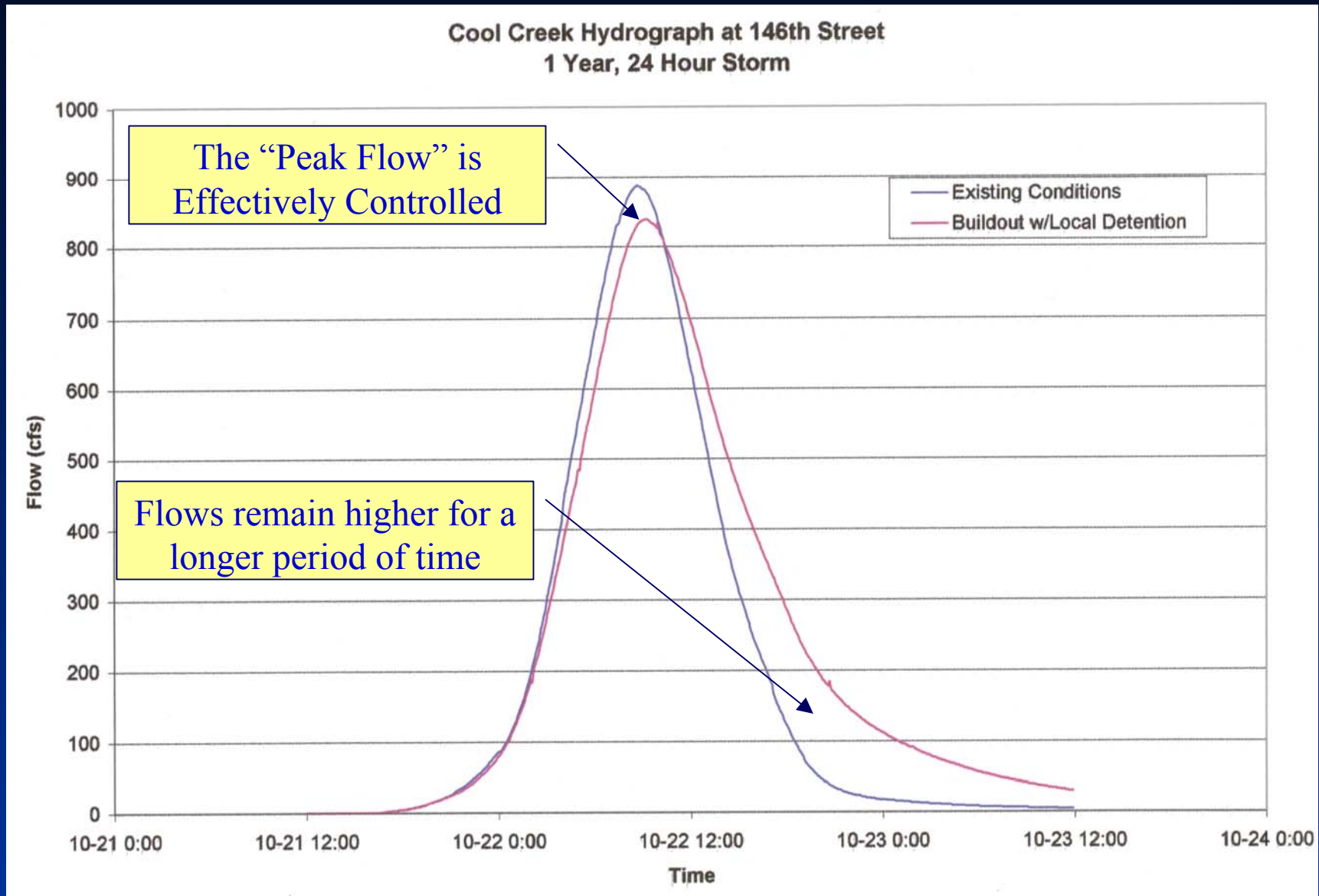


Cool Creek Upstream of White River confluence

Cool Creek Upstream of 116th Street in Golf Course

Problem Analysis

Effects of Urbanization



Problem Analysis

Hydraulic Evaluation

Conveyance Problems in the Upper Reaches of Cool Creek and its Immediate Tributaries

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Examples

Inadequate bridge – 171st St. over Cool Creek

Culverts filled with sediment - Walter Street and Walter Court

Inadequate culverts – Carmel Drive over Hot Lick Creek

Problem Analysis

Stream Channel Evaluation

Severe erosion along lower reach of Cool Creek

Floodplain encroachments constrict flow and increases downstream erosion

Stream Information Compiled on Inventory Maps

Problem Analysis

Water Quality Evaluation

Entailed:

- **Review of the Riparian Corridor**
- **Assessment of Floodplain Development**
- **Water Quality Sampling**

Problem Analysis

Riparian Corridor

Protects Water Quality and Preserves Stream's Natural Characteristics

Forested Riparian Buffer along Cool Creek East of S. R. 431

No Riparian Buffer – Cool Creek South of 191st Street

Problem Analysis

Floodplain Development

Prohibit development in floodplain to help preserve existing buffers and natural flood storage

Problem Analysis

Water Quality Sampling Locations

- 186th Street
- 146th Street
- 116th Street

Problem Analysis

Water Quality Sampling Conclusions

- Pollutant constituents and concentrations in Cool Creek – generally comparable to other urban streams across country
- Nutrients levels somewhat high, possibly from excess fertilizer
- Bacteria levels exceed standards for recreational contact during wet weather *(problem is common to nearly all urban watersheds)*
- Stormwater Best Management Practices will help improve water quality

Solution Development

- Stream Flooding/Road Overtopping Solutions
- Neighborhood Problem Solutions
- Stream Bank Erosion Solutions
- Regional Stormwater Detention
- Future Land Use & Planning Recommendations

Solution Development

Streambank Flooding/Road Topping Solutions

- Replace 171st Street Bridge and Regrade Roadway
- Regrade Roadway at 151st Street bridge
- Replace Gurley Street bridge (Anna Kendall Drain)
- Replace Cherry Street bridge (Anna Kendall Drain)

Solution Development

Streambank Flooding/Road Topping Solutions

- Replace SR 32 Culvert (J.M. Thompson Drain)
- Replace Culvert Downstream of US 31 (Highway Run)
- Add Culvert to US 31 (Highway Run)
- Replace Walter Street and Walter Court Culverts (Highway Run)
- Replace Private Drive Culvert between Walter Street and Walter Court (Highway Run)
- Replace Thornberry Drive Culvert (Highway Run)

Solution Development

Neighborhood Problem Solutions

- Replace Carmel Drive Culvert (Hot Lick Creek)

Solution Development

Streambank Erosion Solutions

Restoration Projects at:

- Highway Run –
  - Downstream of Stonehedge Drive
- H.G. Kenyon Drain –
  - Downstream of Rolling Court
- Cool Creek –
  - Upstream of confluence with the White River,
  - Downstream of Gray Road (at bend),
  - Upstream and downstream of Hot Lick Creek
  - Upstream of 131st Street (Main Street) and
  - Upstream of Keystone Avenue

Solution Development

Regional Stormwater Detention

- **Two (2) off-line Regional Detention Basins to Control the Magnitude of Stormwater Flows and Reduce downstream channel erosion**
  - **Immediately Downstream of 171st Street**
  - **West of Grassy Branch Road**

- **Retrofit existing regional on-line detention provided by RR embankment on Anna Kendall Drain**

Solution Development

Land Use Planning Recommendations

- **Detention Requirements**
  - Improve control of smaller storms (first flush)
- **Stream Buffer Ordinance**
  - Grass filter strips, preservation
- **Floodplain Protection**
  - Prohibit fill in the floodplain
- **Other Best Management Practices**
  - Coordinate with Rule 13 Requirements

Recommendations

Cost of Improvements

Stream Flooding/ Roadway Overtopping Solutions -	$2,720,000
Neighborhood Solutions -	$100,000
Streambank Erosion Solutions -	$570,000
Regional Detention Solutions -	$5,100,000
Total of All Solutions -	**$8,490,000**

Recommendations

Implementation

- Coordinate water quality recommendations with NPDES / Rule 13 program
- Implement bridge/culvert improvements projects in conjunction with planned roadway projects
- Implement neighborhood projects as local funding allows
- Coordinate streambank stabilization projects with local property owners
- Coordinate regional detention solutions with planned development projects

Questions and Answers?